

Claims

Claim 1: (Currently amended) A non-aqueous rechargeable lithium battery having reduced capacity fade rate during cycling, the battery including (1) a lithium transition metal oxide cathode-active material with an LiCoO_2 -type structure and 0.05 to 0.15 wt% lithium borate relative to the weight of said cathode-active material dispersed on the surface thereof, insertion compound cathode, (2) a lithium compound anode, (3) a separator therebetween, and (4) a non-aqueous electrolyte including a lithium salt dissolved in a non-aqueous solvent, wherein said and an amount of lithium borate is dispersed on the surface of said the active cathode-active material, wherein:

(a) ~~the lithium insertion compound is a lithium transition metal oxide with LiCoO_2 type structure; and~~

(b) ~~the lithium borate is an aqueous 0.05 to 0.15 wt% lithium borate solution or an aqueous lithium borate hydrate solution and is mixed with the lithium insertion compound cathode and heated to by drying a mixture of said cathode-active material in an aqueous solution of said lithium borate at a temperature in the range between 250°C and [[to]] 450°C.~~

Claim 2: (Canceled)

Claim 3: (Canceled)

Claims 4-6 (Canceled)

Claim 5: (Canceled)

Claim 7: (Previously presented) A non-aqueous rechargeable lithium battery as claimed in claim 1 wherein the lithium transition metal oxide is a member of the solid solution series $\text{LiNi}_x\text{Co}_{1-x}\text{O}_2$ ($0 \leq x \leq 1$).

Claim 8: (Previously presented) A non-aqueous rechargeable lithium battery as claimed in claim 1 wherein the lithium transition metal oxide is LiCoO_2 .

Claim 9: (Currently amended) A non-aqueous rechargeable lithium battery as claimed in claim 1 wherein the anode comprises a lithiated carbonaceous insertion compound.

Claim 10: (Original) A non-aqueous rechargeable lithium battery as claimed in claim 9 wherein the carbonaceous insertion compound is graphite.

Claim 11: (Original) A non-aqueous rechargeable lithium battery as claimed in claim 1 wherein the lithium salt is LiPF_6 .

Claim 12: (Currently amended) A non-aqueous rechargeable lithium battery as claimed in claim 1 wherein the non-aqueous solvent comprises at least one of a cyclic organic carbonate ~~and/or~~ or a linear organic carbonate.

Claim 13: (Original) A non-aqueous rechargeable lithium battery as claimed in claim 12 wherein the nonaqueous solvent is a mixture of ethylene carbonate, propylene carbonate, diethyl carbonate, ethyl methyl carbonate, and dimethyl carbonate.

Claims 14-26 (Canceled)

Claim 27: (Currently amended) A non-aqueous rechargeable lithium battery having reduced capacity fade rate during cycling, the battery including (1) a lithium cathode-active material with about 0.01% to about 0.15% lithium borate relative to the weight of said cathode-active material dispersed on the surface thereof ~~insertion compound cathode~~, (2) a lithium compound anode, (3) a separator therebetween, and (4) a non-aqueous electrolyte including a lithium salt dissolved in a non-aqueous solvent, wherein said ~~and an amount of~~ lithium borate is dispersed on the surface of said ~~the active~~ cathode-active material; wherein:

(a) ~~the amount of lithium borate is in the range of about 0.01% to about 0.15% of the weight of the lithium insertion compound; and~~

(b) ~~the lithium borate is an aqueous 0.05 to 0.15 wt% lithium borate solution or an aqueous lithium borate hydrate solution and is mixed with the lithium insertion compound and heated to by drying a mixture of said cathode-active material in an aqueous solution of said lithium borate~~ a temperature in the range between 250°C to 450°C.

Claim 28: (Canceled)

Claim 29: (Canceled)

Claim 30: (Canceled)

Claim 31: (Currently amended) A non-aqueous rechargeable lithium battery as claimed in claim 27 wherein the ~~lithium insertion compound~~ cathode-active material is a lithium transition metal oxide cathode with LiCoO_2 type structure.

Claim 32: (Previously presented) A non-aqueous rechargeable lithium battery as claimed in claim 31 wherein the lithium transition metal oxide is a member of the solid solution series $\text{LiNi}_x\text{Co}_{1-x}\text{O}_2$ ($0 \leq x \leq 1$).

Claim 33: (Previously presented) A non-aqueous rechargeable lithium battery as claimed in claim 31 wherein the lithium transition metal oxide is LiCoO_2 .

Claim 34: (Currently amended) A non-aqueous rechargeable lithium battery as claimed in claim 27 wherein the anode comprises a lithiated carbonaceous insertion compound.

Claim 35: (Previously presented) A non-aqueous rechargeable lithium battery as claimed in claim 34 wherein the carbonaceous insertion compound is graphite.

Claim 36: (Previously presented) A non-aqueous rechargeable lithium battery as claimed in claim 27 wherein the lithium salt is LiPF_6 .

Claim 37: (Currently amended) A non-aqueous rechargeable lithium battery as claimed in claim 27 wherein the non-aqueous solvent comprises at least one of a cyclic organic carbonate ~~and/or~~ or a linear organic carbonate.

Claim 38: (Previously presented) A non-aqueous rechargeable lithium battery as claimed in claim 37 wherein the nonaqueous solvent is a mixture of ethylene carbonate, propylene carbonate, diethyl carbonate, ethyl methyl carbonate, and dimethyl carbonate.